Psychological Medicine, 1998, **28**, 503–508. Printed in the United Kingdom
© 1998 Cambridge University Press

CONCEPTUAL PAPER

A conceptual framework for mental health services: the matrix model

MICHELE TANSELLA[1] AND GRAHAM THORNICROFT

From the Servizio di Psicologia Medica, Istituto di Psichiatria, Università di Verona, Verona, Italy; and the Section of Community Psychiatry, Institute of Psychiatry, London

ABSTRACT

Background. The reform of mental health services needs to be guided by an overall conceptual framework. Such a framework is important to avoid many risks, including extrapolating from a specific service site to other services, without taking into account local and regional variables.

Methods. A conceptual framework, the 'matrix model', is proposed. This model has been developed using the most relevant information that is necessary for describing and interpreting mental health services data as well as patient-based information.

Results. The 'matrix model' has two dimensions: the geographical, which refers to three levels (country, local and patient) and the temporal, which refers to three phases (inputs, processes and outcomes). Using these two dimensions a nine-cell matrix is constructed to bring into focus critical issues for mental health services. The relevance of each level and each phase is briefly presented.

Conclusions. The matrix is intended to assist clinicians, planners and researchers to deal with clinical phenomena, organizational issues, and research questions that share a degree of complexity that render inadequate analyses and the interventions made only at one level. The matrix model applies particularly to mental health systems of care that are provided with a public health framework, and is less useful for contexts that consist of clinicians offering only one-to-one treatments, within fragmented programmes of care.

INTRODUCTION

The need for a conceptual framework

The reform of mental health services is now a prominent issue in most Western developed countries and also in several countries of Central and Eastern Europe. Although the speed and the precise local detail of these changes vary between countries, there is a clear need for an overall conceptual framework that can guide both those leading and those who are affected by these changes (Kuhn, 1962). A conceptual framework for health service research is important to avoid, for example, two types of risk: general descriptions referring to large areas, which are difficult to use in any particular site; and data from a specific service, from which it is difficult to extrapolate. Such a framework can be useful because it facilitates the bridging of information between different levels of analysis.

In this paper we propose as such a conceptual framework, the 'matrix model' (see Table 1), which uses two dimensions: the geographical and the temporal. The first dimension refers to three geographical levels: (1) country; (2) local; and (3) patient. The second dimension refers to three temporal phases: (A) inputs; (B) processes; and (C) outcomes. Using these two dimensions we construct a 3×3 matrix to bring into focus critical issues for mental health services.

Many types of information need to be taken into account when planning, delivering and modifying services. The sources of this infor-

[1] Address for correspondence: Professor Michele Tansella, Servizio di Psicologia Medica, Istituto di Psichiatria, Ospedale Policlinico, 37134 Verona, Italy.

https://doi.org/10.1017/S0033291796005880 Published online by Cambridge University Press

Table 1. *Overview of the matrix model, with examples of key issues in each cell of the matrix*

Geographical dimension	Temporal dimension		
	(A) Input phase	(B) Process phase	(C) Outcome phase
(1) Country/Region level	1A Expenditure on services Role of the media Mental health law Government directives Special interest groups	1B Performance/activity indicators (e.g. admission rates, bed occupancy rates, compulsory treatment rates)	1C Suicide rates SMRs Homelessness Special enquiries
(2) Local level (catchment area)	2A Population needs assessment Population characteristics Budget Staff Fixed expenditure Consumer participation	2B Operational policies Pathways to care Patterns of service use Case loads Contact rates Targeting of special groups	2C Outcomes studies at group level Secondary and tertiary prevention Decrease of local stigma Better access to services
(3) Patient level	3A Individual needs assessment Demands made by patients Demands made by families	3B Quality of treatments Frequency and duration of treatment Continuity of care Income support Vocational services	3C Symptom reduction Satisfaction Quality of life/accommodation Disability/work rehabilitation Burden on care-givers

mation include the results of scientific research, reports of opinions based on clinical experience, the views of patients and their carers, and wider public expectations with their representation by politicians and the media. There is a current trend in medicine to attach most credibility to research results at the patient level (level 3). Indeed the approach used for systematic reviews, is usually to include only data produced by randomized controlled trials (RCT), which is the technique of choice at the patient level. In practice this systematically excludes consideration of information from the other two levels (Cochrane Library, 1996). This is not to argue that any unsubstantiated views originating from the local and country levels (levels 2 and 1) should be counted as valid evidence, but rather that high-quality scientific enquires at these two levels are relatively neglected.

The RCT is a technique which primarily establishes the efficacy of a specific treatment, intervention or procedure for a group of affected individuals. In relation to health services research, 'efficacy' we mean the therapeutic potential of a treatment, i.e. how far it improves outcomes under optimal experimental conditions. However, the RCT method is less well suited to assessing clinical 'effectiveness', which can be defined as the actual results obtained by an intervention in unselected patient populations who seek care from routine clinical services, where these are issues of measurement at level 2, the local level (Ruggeri & Tansella, 1995; Taylor & Thornicroft, 1996). Therefore, the RCT design is costly and difficult to apply at the local level (level 2), and is largely unsuited to whole populations (level 1).

THE GEOGRAPHICAL DIMENSION

The country/regional level

By 'country' we mean the level with a shared government at which mental health laws are established, any relevant minimum clinical standards are set, overall policy is formulated and which is often the level at which the training of professionals is organized. The issues relevant at this country/regional level can be considered in the following domains: social, political and legal; economic; and professional.

First, in the social and political domain, there is the balance that exists in each country, on one hand between concerns for the duty of care to individual patients and the degree of importance attached to their civil liberties, and on the other hand the legitimate expectations of the wider public to be protected from harm from patients. In this case mental health policies will reflect the wider mood of the times along a continuum between acceptance and tolerance at one ex-

https://doi.org/10.1017/S0033291796005880 Published online by Cambridge University Press

treme, and exclusion and prejudice at the other. In these ways clinical decisions of professionals in difficult cases are often guided by the wider climate of social opinion.

Secondly, economic issues acting at the country level influence clinical practice. In terms of public expenditure on mental health services, the overall level of economic development (along with the relative importance attached to mental health in relation to other medical specialities) has a profound effect upon the extent and quality of the clinical services available. The methods used to allocate health expenditure from central finance ministries to local regions, and then to individual local areas vary enormously, for example in the extent to which these allocation methods take account of local variations in psychiatric morbidity.

Equally, economic cycles of growth and recession, which may affect different subgroups of the population in different ways, influence the direct funding of state mental health services (both capital and revenue), the provision of welfare benefits, expenditure on mental health research, and such cycles have indirect effects mediated by levels of employment. Unemployment, for example, has established effects on suicide and on the onset, course and outcome of psychiatric disorders (Warr, 1987; Warner, 1994).

The third set of tissues acting at the country level concerns standards of care and agreed staffing levels, professional training, accreditation and continuing education. Training in many European countries, for example, is based upon curricula developed when psychiatric services were hospital-based. There is often a clear phase lag in which clinical practice moves ahead of the content of training courses, whose curricula are formulated at country level.

The local level

By 'local level' we mean the catchment area for which an integrated system of care for general adult mental health services can be provided in each setting. The population size will vary between countries and regions, but is generally between 50000–250000 residents.

Several key issues need to be considered to understand the importance of the local level. First, the local level, as we conceptualize it here, may or may not exist in terms of the organization of services in any particular area. Most European countries have an administrative infrastructure which organizes health, social and other public services for defined geographical areas. Health systems with a greater degree of deregulation, such as that in most parts of the United States, may more weakly reflect the public health approach, without which a meaningful and efficient integration of services becomes extremely difficult to achieve.

Secondly, knowing the sociodemographic characteristics of each local area can guide assessment of needs for services, and assist the siting of facilities, by using specific population indicators, either individual census-based or composite scores of social deprivation, or by being based upon a local and less structured consensus of views. In this respect a health indicator may be defined a measure that summarises information relevant to a particular phenomenon, or which acts as a reasonable proxy for such a measure (Cook & Campbell, 1979). Thirdly, the local level is usually the most relevant scale at which to formulate a service strategy which will take into account the following types of interface with other general and specialist psychiatric services.

Indeed, the local level is usually the best level of analysis to consider the components of the general adult mental health system, their organisation and their integration with each other. Such components will often include, for example, community mental health teams, in-patient services, and day care. A series of key questions arise at this level, for example, are services better organized with generic or separate specialized, and are the main components of adult mental health services mutually substitutable, so that the creation of home treatment mental health teams reduce the requirement for in-patient beds? For all these questions little research information exists, and the RCT strategy is unlikely to produce answers unless applied in a multi-site and long-term design, with no or few excluded patient groups.

The patient level

By 'patient level' we refer to the therapeutic domain which may include treatment, care and support for individual patients, or for small groups of patients, who share common characteristics or problems, as well as interventions for

https://doi.org/10.1017/S0033291796005880 Published online by Cambridge University Press

the wider networks of patients, including their families and carers. This level is traditionally considered to be the only proper territory of the clinician, although we shall argue that the practice, as well as the outcome, of clinical psychiatry strongly depends upon the characteristics of the other two levels. It is, therefore, important for clinicians to be aware of how processes at these higher levels may positively or negatively influence their clinical work, and this may especially be the case for those who have a psychodynamic orientation and who tend, therefore, to concentrate solely upon the patient level.

In traditional clinical practice doctors see the particular patients who come to their attention and they mainly base their views about the characteristics of morbidity upon these experiences. This is a view which only considers the patients receiving care (enumerator) and takes no account of the total population at risk (denominator). By comparison the usual perspective of the family doctor and of other primary-care practitioners is not only cross-sectional but also longitudinal and contextual. It is this view which is promoted by widening the perspectives of mental health professionals to include other levels of both the geographical and temporal dimensions.

THE TEMPORAL DIMENSION

The input phase

Inputs are the resources that are put into the mental health care system. We consider here as inputs those elements that are injected into the total mental health service system, and which need to be distinguished from the activities that take place within that system in providing mental health care, which we describe below as the process phase. These resources enter the system at the three geographical levels, and may be further categorized as visible or invisible.

The 'visible inputs' consist mainly of staff and facilities. In psychiatry, as compared with other medical specialities, a relatively small contribution towards visible inputs is expenditure on medication, supplies, equipment and investigations. Visible expenditure on staff includes the numbers, the mix of different disciplines such as psychiatrists, psychologists and nurses and their relative distribution across the service as a whole.

Often forgotten are the 'invisible inputs', which activate the visible system input, and which potentiate the effective functioning of the service network, and without which the visible inputs may be rendered largely ineffective. Indeed the usual influence of these invisible inputs become manifest when they are absent, unrecognized or disregarded. One example is the importance of establishing good working relationships between specialist and general heath services, and between health and social services, for the joint care of people with long-term and severe mental illness. Such invisible system inputs include: the experience, qualifications and training of staff, which regularly update staff to avoid skill degradation, and the degree of match between their abilities and the style of working in each particular service.

From the whole range of visible and invisible service inputs, often the only elements to be quantified in health service research studies are the number and use of psychiatric beds. Equally, the response to any system failure, which is commonly a complex product of inadequacies or dysfunctions in many service components, is often reduced to a question of how many more beds are needed. Invisible inputs, therefore, usually remain excluded from consideration, even in the most sophisticated attempts to evaluate mental health services.

The process phase

The process phase describes those activities which take place to deliver mental health services. For describing such a wide range of activities and how adequately the service system functions, the variables most often chosen as descriptors are not those providing direct data on how services operate, but those which are more readily available. Although the importance has long been recognized of an adequate and reliable system to classify the process of care, it is notable that this has not been achieved in any widely agreed way. Even at the highest level of aggregation, to allow inter-country comparisons of services, no common currency exists to define and measure process variables.

At the individual level, it is striking that the question of what processes happen in meetings between mental health staff and patients in routine clinical encounters is almost unresearched. Although in most other medical specialities very detailed attention is paid to the

https://doi.org/10.1017/S0033291796005880 Published online by Cambridge University Press

content of the therapeutic process, in terms of the specific treatments used, and the dose, combination, timing and adherence to agree protocols, by contrast the content of most mental health service contacts is a black box. The reasons for this may include a reluctance (except for research into behavioural and cognitive–behavioural treatments) to address the difficulties of constructing adequate assessment measures of 'talking treatments', and a marked emphasis in psychodynamically orientated psychiatry upon the importance of the confidential nature of the clinical session. Moreover, the relative isolation throughout most of the last century of psychiatry from other medical disciplines has rendered it less open to scrutiny and inspection.

The outcome phase

Outcomes are generally considered to be changes in functioning, in morbidity and mortality, both at the individual patient as well as at the population levels (Thornicroft & Tansella, 1996). These outcomes are attributable to the treatment and care received, which themselves can be analysed as input and process variables. Outcomes are, therefore, a complex product of multiple influences, and they can be considered at the three geographical levels of the matrix model. The difficulties associated with defining and collecting outcomes data have meant that input and process variables have often been used as proxies for outcomes, a categorical error (Jenkins *et al*. 1994).

EXAMPLES OF THE USE OF THE MATRIX MODEL

We present here two examples of the application of the matrix model. The first illustration refers to how the model can assist in understanding the possible causes and effects of episodes of severe violence committed by psychiatric patients. In practice the causes of such incidents are often described primarily at the patient level (the patient and the direct care staff), but the consequences seldom remain at that level, and may affect both the local and country levels. Characteristically these extreme adverse events are multi-causal and so the use of a clear multi-level framework, such as the matrix model, allows many concurrent factors at different levels in the mental health service system to be taken into account. In other words, when the analysis is complex, then the response must be commensurate to the degree of complexity.

For example, an enquiry into an individual adverse outcome, for example an incident of severe violence committed by a patient, (Cell 3C in Table 1) we may need to analyse the precursors to the event in terms of the lack of a local method to establish and maintain maximum clinical case loads (Cell 2B) for community-based staff, an inadequate degree of targeting of most severely disabled patients (Cell 2B), and poor local staff training (Cell 2A), in the context of low national rates of investment in mental health services (Cell 1A). As a consequence the required responses should be placed at precisely those locations (Cells) where weaknesses have been recognized.

A second example of learning from experience refers to how information from services in one site, both from direct visits and from published descriptions, can be translated to be relevant to another. What people do in practice is to adapt experience from other centres and information from the research literature to make a diagnosis of the relative strengths and weaknesses of services in their local area, and to formulate a clear course of action for their improvement. Without a conceptual framework, this process, essentially one of translation, is often difficult for two reasons. First, in deciding which aspects of 'foreign' data are relevant to local circumstances, and secondly, in knowing how to implement the service requirements identified from the system diagnosis. The outcome of such a local translation process can be several possible courses of action. Commonly, the information conveyed consists of visible local service inputs, including physical and staff resources (part of Cell 2A) and some limited process details on the style of working and clinical contact rates (Cell 2B), along with limited data on outcome variables at the patient (Cell 3C) or local levels (Cell 2C). What we need in fact is a standardized account of the small number of most relevant features in every cell of the matrix more fully to understand any particular local service which demonstrates good practice, and so to appreciate how best to transfer such practice to other settings. An example of the translation of one service component from North America to

https://doi.org/10.1017/S0033291796005880 Published online by Cambridge University Press

Britain is the introduction of case management (CM) and assertive community treatment (ACT). At the national level there has been a prioritization of the severely mentally ill (Department of Health, 1994) that has encouraged CM and ACT; at the local level specific procedures (called the Care Programme Approach) have been established to require the allocation of case managers and the organization of regular clinical review meetings; while at the patient level widely differing interpretations of CM have been made in practice.

CONCLUSION

In this paper we have presented a conceptual framework that can place research and clinical issues at their correct levels of analysis, and which can be used as a lens to sharpen our understanding of the multiple factors acting at the three geographical levels and three temporal phases. The matrix is intended to assist clinicians, planners and researchers since clinical phenomena, organizational issues, and research questions in psychiatry, share a degree of complexity that renders analyses and interventions that are made only at the patient level inadequate.

The matrix applies particularly to mental health systems that are mainly state-funded and which are provided within a public health framework. It is less useful for contexts which consist of clinicians offering one-to-one treatment, especially in systems of private practice. This is not because clinical phenomena in these contexts are less complex, but because in such settings the implicit clinical contract, and the supporting organizational arrangements, operate only within the patient level.

At present, given the absence of agreed measures beyond simplistic input variables at all three geographical levels, we act as if these convey meaningful information about process and outcome. For example, we incorrectly substitute the number of psychiatric beds used for any direct measure of system outcome. Similarly, a reduction in hospital admissions or length of stay (process indicators) are frequently used as an indices of individual outcome. Historically, progress has been made in treating individual patients by providing clinical care that is more rational because it is increasingly evidence-based. The matrix model may encourage precisely this trend to occur also at the local and country level and so to contribute towards making mental health services more rational (Tansella, 1997).

We are grateful to Professor Norman Sartorius (Geneva) who read an early version of the paper and gave helpful suggestions.

This study was supported, in part, by the Ministero dell'Università e della Ricerca Scientifica (MURST, Roma), Progetti di Ricerca Quota 60%, with a grant to M. Tansella.

REFERENCES

Cochrane Library (1996). (Database on Disk and CD-ROM). *The Cochrane Collaboration*, *Issue 3*. Update software: Oxford. Available from BMJ Publishing Group: London.

Cook, T. & Campbell, D. (1979). *Quasi Experimentation: Design and Analysis for Field Settings*. Rand McNally: Chicago, IL.

Department of Health (1994). *The Health of the Nations*, 2nd edn. HMSO: London.

Jenkins, R., Brooksbank, D. & Miller, E. (1994). Ageing in learning difficulties the development of health care outcome indicators. *Journal of Intellectual Disability Research* **38**, 257–264.

Kuhn, T. S. (1962). *The Structure of Scientific Revolutions*. University of Chicago Press: Chicago.

Ruggeri, M. & Tansella, M. (1995). Evaluating outcome in mental health care. *Current Opinion in Psychiatry* **8**, 116–121.

Tansella, M. (ed.) (1997). *Making Rational Mental Health Services*. Il Pensiero Scientifico Editore: Roma.

Taylor, R. & Thornicroft, G. (1996). Uses and limits of randomised controlled trials in mental health services research. In *Mental Health Outcome Measures* (ed. G. Thornicroft and M. Tansella), pp. 143–152. Springer Verlag: Heidelberg.

Thornicroft, G. & Tansella, M. (ed.) (1996). *Mental Health Outcome Measures*. Springer Verlag: Heidelberg.

Warner, R. (1994). *Recovery from Schizophrenia*, 2nd edn. Routledge: London.

Warr, P. (1987). *Work*, *Unemployment and Mental Health*. Oxford University Press: Oxford.

https://doi.org/10.1017/S0033291796005880 Published online by Cambridge University Press